Climate change on the Kenai Peninsula: Cooked moose?

by John Morton

When Franklin Roosevelt established the Kenai National Moose Range in 1941, it was to protect the habitat of the "giant Kenai moose," then considered a subspecies unique to the peninsula. Although we now know our moose were simply big and our name has changed to the Kenai National Wildlife Refuge, the moose continues to be our patron saint.

The refuge is home to almost 5,000 moose. During the summer, moose like to feed in wetlands and shallow lakes. During the winter, moose browse on young aspen, birch, and willow that sprout after fire. Fires in black and white spruce that are hot enough to burn down to mineral soil will "convert" conifer stands to hardwood. Good moose habitat is provided for 15 to 25 years after these mineral soil-exposing fires. This is one of the reasons why moose numbers were so high in Game Management Subunit 15A, north of the Sterling Highway, for so many years after the big fires in 1947 and 1969.

But the Kenai Peninsula is changing in response to a climate that is becoming warmer and drier. Treeline has crept up the Kenai Mountains over 50 meters since the 1950s. During the same period, water levels in closed-basin lakes declined by as much as one meter. Many of these same ponds are now grassy meadows that are being invaded by black spruce and hardwood shrubs. The Harding Icefield lost 70 vertical feet and 5% in surface area over the same period. Bark beetle outbreaks in Sitka and white spruce will likely be more frequent and last longer as temperatures increase. Similarly, wildfire in black and white spruce is expected to be more intense and more frequent than the current mean fire return intervals of 79 and 514 years, respectively, as the climate dries.

How will all these changes affect moose on the Kenai? The knee-jerk response is that more fire means more browse which begets more moose. But the answer isn't that simple. As fires get hotter and more frequent in spruce, conversion to hardwood will increase. This means that a greater proportion of forests will become birch and aspen. While this is good in the short run for moose, fires will eventually become less prevalent on the peninsula because hardwoods are relatively resistant to fire. Fires will continue to burn more frequently and hotter in spruce forests, but the total spruce acreage on the peninsula will diminish over time as the expanding aspen and birch forests mature.

Dr. Glenn Juday, at the University of Alaska Fairbanks, has suggested that our forests will become more like those currently in Alberta: more open (parkland-like) with a grass understory and perhaps invaded by lodgepole pine. We would still have moose, but perhaps not at the relatively high densities that we've seen in the past on the Kenai. And with shallow ponds and wetlands drying on the Kenai, the submerged aquatic vegetation that moose like to feed on in the summer will be less available.

Snow cover is expected to be more variable and less persistent than it has been historically. Indeed, a review paper published this past year in the Journal of Climate shows that snowpack in the western U.S. has diminished in the past 50 years, with more rain and earlier snowmelt in the spring. Despite the arctic winter we're experiencing this year, winters in the past few years have been all over the chart. Again, the knee-jerk response is that reduced snow cover or even no snow cover is easier on moose, particularly last year's calves. But moose have disproportionately long legs because they evolved in the boreal forest and its climate.

We can look to an example in the boreal forests of Minnesota, which is on the extreme southern edge of the moose range in North America. Moose have declined in the northwest part of that state since peak numbers in 1984.

After ruling out hunting, browse quality and quantity, and disease, research completed by Dr. Warren Ballard from Texas Tech University suggests that increased temperatures in September and March since 1984 caused heat stress in moose. This has resulted in lower reproductive rates and poorer body condition than what would be normal during these times of the year. Despite high calf survivorship, these researchers conclude that the moose population will continue to diminish in their part of the world as long as the current climate trends continue.

It also is likely that Sitka black-tailed deer will

get established and perhaps proliferate on the Kenai in years to come. Small populations that were transplanted to Prince William Sound in 1916 have expanded their range in recent years. Sightings of deer in the Portage and Placer River drainages since the 1990s have included both bucks and does.

Deer on the peninsula doesn't bode well for moose. An article by Arnold Boer in the *Ecology and Management of the North American Moose* states that where moose and deer overlap in range, they generally don't compete for browse because their different abilities to cope with snow keep them segregated. However, increasing variability in snowfall on the Kenai may mean that competition with deer may reduce moose numbers.

Moose have declined in many parts of the eastern U.S. due to meningeal worm, a neurological disease that can be fatal in moose. The white-tailed deer is the usual host of this parasite, and it currently is not known to occur in Alaska.

Of course, all of this is conjecture on my part. Moose may do well on the Kenai under a warmer climate. Climate change is interesting for that very reason. It forces us to re-examine why our natural world is the way it is.

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